We claim:

1. A process for the fractionation or purification of water soluble polymers comprising:
    a. dissolving a known amount of the polymer in water to form a clear solution,
    b. equilibrating the solution at a temperature that allows the formation of an opaque solution when an aqueous soluble extraction salt is added to the solution,
    c. adding an extraction salt to the solution,
    d. maintaining the solution at the temperature of step b until two phases form in the solution,
    e. removing the lower phase,
    f. replacing the volume of the lower phase by adding water to the remaining solution,
    g. repeating steps b through f the required number of times to cause the desired fractionation,
    h. isolating the upper phase of the final extraction,
    i. removing the water and extraction salt to yield the fractionated polymer.
2. The process of claim 1 wherein the concentration of the extraction salt is sufficient to cause two distinct phases to form at the selected temperature.
3. The process of claim 2 wherein the aqueous soluble extraction salt is selected from the group consisting of sulfate, citrate, or phosphate salts.
4. The process of claim 2 wherein the water soluble polymer is a polyol or a polyether.
5. The process of claim 4 wherein the polyol polymer is composed of ethylene oxide monomers joined by ether linkages.
6. The process of claim 4 wherein the polyol is a polyoxyalkylene block copolymer.

7. The process of claim 6 wherein the polyoxyalkylene block copolymer is a poloxamer.

8. The process of claim 6 wherein the polyoxyalkylene block copolymer is a poloxamine.

9. The process of claim 4 wherein the aqueous extraction salt is ammonium sulfate.

10. The process of claim 9 wherein the concentrations of the polyol polymer and ammonium sulfate, and the extraction temperature are adjusted so that the lower molecular weight polyol polymer molecules partition into the high salt concentration (lower) phase and the higher molecular weight polyol polymer molecules partition into the low salt concentration (upper) phase of the aqueous fractionation medium.

11. The process of claim 10 wherein the concentration of ammonium sulfate is about 5 to about 25% by weight of the solution.

12. The process of claim 10 wherein the concentration of the polyol polymer may be up to 10% by weight of the extraction solution.

13. The process of claim 10 wherein the extraction temperature ranges from about –5 to about 30°C.

14. The process of claim 10 wherein the extraction temperature ranges from about –2 to about 10°C.

15. The process of claim 1 wherein the polydispersity of the resulting polyol polymer is reduced.

16. The process of claim 1 wherein the viscosity of aqueous solutions of the resulting polyol polymer is increased between about 25 and about 40°C.

17. The process of claim 1 wherein the viscosity of aqueous solutions of the resulting polyol polymer increases rapidly over a narrow temperature range.

18. The process of claim 1 wherein the aqueous soluble extraction salt is replaced by an aqueous soluble polymer that is incompatible with the polymer that is to be fractionated.

19. The process of claim 18 wherein the concentrations of the polymer to be fractionated, and the incompatible polymer, and the extraction temperature are adjusted so that the extraction system forms two phases.

20. A purified water soluble polymer made by the process of claim 1.